What is claimed is:

[Claim 1] A method for assembling an electronic module comprising:

attaching a chip to a substrate using a first solder interconnection array;

attaching a board to said substrate using a second solder interconnection array such that a space is defined between said board and said substrate, said second solder interconnection array residing entirely within said space; and

providing a creep resistant structure within said space, said creep resistant structure being in direct contact with at least said board and said substrate to maintain said space and optimize integrity of said second solder interconnection array.

[Claim 2] The method of claim 1 wherein said creep resistant structure comprises at least one rigid metallic ball.

[Claim 3] The method of claim 1 wherein said creep resistant structure comprises at least one mechanical support structure selected from the group consisting of a bracket, a frame and a collar.

[Claim 4] The method of claim 1 wherein said creep resistant structure comprises an underfill material.

[Claim 5] A method for assembling an electronic module comprising:

attaching a chip to a substrate using a first solder interconnection array;
attaching an organic board to said substrate using a second solder interconnection array thereby defining a space between said organic board and said substrate, said second solder interconnection array residing entirely within said space;
depositing an underfill material within said space such that said underfill material contacts both said organic board and said substrate and selected solder joints of said second solder interconnection array; and
curing said underfill material to form a rigid matrix within said space to maintain and enhance integrity of said second solder interconnection array.

[Claim 6] The method of claim 5 further including the step of cleaning surfaces of said organic board and said substrate within said space prior to depositing said underfill material to enhance adhesion of said underfill material to said organic board and said substrate.

[Claim 7] The method of claim 5 further including the step of providing at least one rigid metallic ball within said space to further maintain and enhance integrity of said second solder interconnection array.

[Claim 8] The method of claim 5 further including the step of providing at least one mechanical support structure selected from the group consisting of a bracket, a frame and a collar within said space to further maintain and enhance integrity of said second solder interconnection array.

[Claim 9] The method of claim 5 wherein said second solder interconnection array comprises a single melt solder interconnection array.

[Claim 10] The method of claim 5 wherein said second solder interconnection array comprises a dual melt solder interconnection array.

[Claim 11] The method of claim 5 wherein said underfill material entirely encapsulates said second solder interconnection array.

[Claim 12] The method of claim 5 wherein said underfill material partially encapsulates said second solder interconnection array at discrete locations within said second solder interconnection array.

[Claim 13] The method of claim 5 wherein said space has gap heights residing between said organic board and said substrate ranging from about 300 microns to about 900 microns, said underfill material being capable of filling said gap heights.

[Claim 14] The method of claim 5 wherein said underfill material in its uncured state comprises a polymeric material having a filler material present in an amount ranging from about 60% by weight per solution to about 64% by weight per solution, said filler material having a particle size ranging from about 2% to about 33% of a gap height residing between said organic board and said substrate within said space.

[Claim 15] The method of claim 14 wherein said underfill material in its uncured state has a density ranging from about 1.5 g/cc to about 2.0 g/cc, a viscosity at 25°C greater than about 5,000 cP, and a Thixotropic Index ranging from about 1.0 to about 2.0.

[Claim 16] The method of claim 15 wherein said underfill material in its cured state has a glass transition temperature ranging from about 135°C to about 145°C, and a dynamic tensile modulus strength at about 25°C greater than about 5 Gpa.

[Claim 17] The method of claim 16 wherein said substrate comprises a ceramic substrate, said cured underfill material has a CTE below Tg of about 18 ppm/°C to about 21 ppm/°C, and a CTE above the Tg of about 85 ppm/°C.

[Claim 18] The method of claim 16 wherein said substrate comprises a organic substrate, said cured underfill material has a CTE below Tg of about 12 ppm/°C to about 25 ppm/°C, and a CTE above the Tg of about 70 ppm/°C.

[Claim 19] An electronic module assembly comprising:

a chip attached to a substrate via a first solder interconnection array;

a board attached to said substrate via a second solder interconnection array;
a space defined between said organic board and said substrate, said second solder interconnection array residing entirely within said space; and
a creep resistant structure within said space between said board and said substrate to maintain said space and optimize integrity of said second solder interconnection array.

[Claim 20] The assembly of claim 19 wherein said creep resistant structure is selected from the group consisting of a rigid matrix of underfill material, a metallic ball, a bracket, a frame, a collar, and combinations thereof.